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USERS GUIDE FOR THE MILSATCOM LOADING PROGRAM 'OPAL'
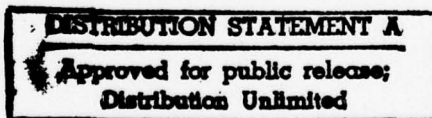
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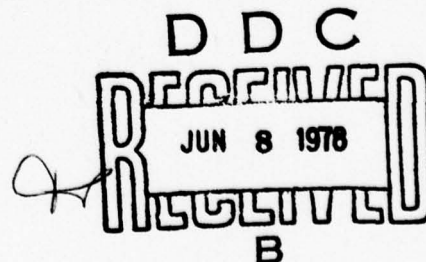Computer Program Users Guide

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Prepared for

MILSATCOM Systems Office
Defense Communications Agency
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
This report describes the use of a computer program that interfaces with the JCS-approved User Requirements Data Base (URDB) to assess the ability of different satellites to meet stated requirements. Input to the program consists of specifications of various program options controlling satellite modeling, the loading algorithm and "sieves" on the URDB. Output consists of loading results summarized according to several criteria. The program is run in batch on the IBM/370 at Reston, VA, or the IBM/360 at Arlington. Interactive run setup is available at the Reston facility.

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TABLE OF CONTENTS

ILLUSTRATIONS

TABLES

USERS GUIDE FOR THE MILSATCOM LOADING PROGRAM 'OPAL'

1   INTRODUCTION.

1.1   Background.

      This report is a guide to the use of the OPAL MILSATCOM
Loading Program. OPAL is the acronym for a computer program, developed
for the Defense Communications Agency (DCA) by ESL Incorporated, which
interfaces with the MILSATCOM Systems Office User Requirements Data
Base (URDB) to provide summaries of satellite loading of selected
portions of that data base. A complete description of OPAL, in terms
of its interface with the URDB and other supportive data bases, is
provided in Reference 1.

      OPAL is designed for use on the IBM System 370/155 Computer
at the DCEC Hybrid Simulation Facility (HSF) and on the IBM System 360
Computer at DCA Arlington. As such, this users guide is applicable
only to operations at these facilities.

1.2   Program Overview.

      Due to the classified nature of the URDB and other supportive
data bases, it is necessary that the OPAL Loading Program be run as a
batch job during classified operations. However, to assist the user
in setting up runs that are both consistent and complete, a separate
interactive computer program is available and is accessed via the
"TSO" (interactive) system.

_____

[1]P.D. Shaft, "Description of the MILSATCOM Loading Program 'OPAL',
 ESL Incorporated, Sunnyvale, CA, Report ESL-TM888, 30 September 1977

1.2   -- Continued.

A simplified relationship of the interactive setup and batch
loading program is illustrated in Figure 1. Through the interactive
program the user creates a dataset that contains sets of codes defining
various options to be used by the batch loading program. When such a
dataset has been created, it is then loaded onto magnetic tape for
later batch processing.

The use of OPAL can therefore be divided into two parts:
using the interactive program to set up runs in a "codes" dataset;
and running the batch program to provide loading summaries. Incidental
to these are such operations as copying the "codes" dataset from TSO
to magnetic tape, obtaining compiled versions of the program for
execution, etc.

1.3   Organization of This Report.

The use of OPAL is described in two sections:

a.   setting up runs via TSO;
b.   processing runs on the batch system.

In describing run setup, emphasis is placed on available commands and
options. The interactive program is designed to provide necessary
assistance to the user and to signal errors in usage as they occur.
Conversely, the batch program is invoked by a single "JCL statement"
and the emphasis here is on interpreting the output. Incidental
operations are discussed as appropriate.

It should be emphasized that this report does not provide
a complete description of the OPAL computer program; that is left

2

TSO OPERATIONS   CLASSIFIED OPERATIONS
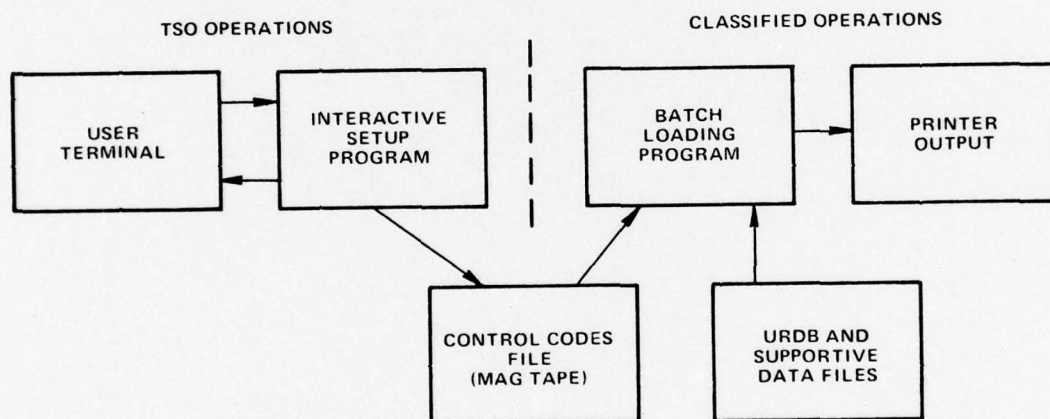
Figure 1. Simplified Operation of the OPAL Computer Program

3

1.3   -- Continued.

to the Final Report. Rather, it is a quick-reference guide that the user should consult for an overview of program operation or when specific questions of usage arise.

2   RUN SETUP PROGRAM.*

2.1   Introduction.

This section describes the use of TSO and the interactive
computer program in setting up runs for batch processing.

2.2   TSO Procedures.

All TSO commands necessary to obtain and execute the inter-
active program and to move the resulting "codes" file to tape are
contained in a CLIST (command-list) dataset, OPAL.CLIST. This subsection
provides a step-by-step guide to the operation of the CLIST.

2.2.1   STEP 1: Obtaining the CLIST.

The TSO command,

LISTCAT

will indicate the presence of OPAL.CLIST in the user's catalog. If the
dataset is not present, it may be obtained by entering the TSO command
string,

LBG OPAL CLIST DS('N800.LIBRARY') RON

2.2.2   STEP 2: Obtaining the Interactive Program.

The interactive program must be present in the user's catalog
as an executable dataset, OPAL.LOAD. If the LISTCAT command (issued in

* The interactive Run Setup Program is available at the HSF installation
  only; refer to the OPAL Final Report for a description of batch-job setup.

5

2.2.2   -- Continued.

STEP 1, above) does not indicate the presence of OPAL.LOAD, the CLIST
commands are used to obtain it.

Enter the TSO command string,

EXEC OPAL 'COMP BADGE(badge)'

where badge is a valid badge number. TSO will print several lines,
including

N2770SET PASSED TO BATCH--
badge WILL BE NOTIFIED UPON COMPLETION.

This indicates that a job has been submitted for batch processing to
create a load module. The message

IEF404I N2770SET ENDED TIME=hh.mm.ss

indicates the job is complete and OPAL.LOAD is present in the user's
catalog.

2.2.3   STEP 3: Accessing the Interactive Program.

To access the interactive program for the purpose of setting
up runs, enter the TSO command string,

EXEC OPAL 'SETUP'

This will result in a transfer of control over to the interactive
program (operation within the interactive program is described in the
following subsection). When the interactive program terminates, TSO
will print

2.2.3   -- Continued.

EXEC OPAL MOVE TO PASS JOB
TO CLASSIFIED SYSTEM FOR BATCH PROCESSING

as a reminder to transfer the control codes file to magnetic tape for
batch processing.

The interactive program may be accessed any number of times
in this manner and will keep track of previously created runs.

Note: The message

OPAL.LOAD NOT IN CATALOG

indicates that the interactive program is not present in the user's
catalog; return to Step 2, above.

2.2.4   STEP 4: Passing the Codes to Batch.

When the desired number of runs have been set up via the
interactive program, enter the TSO command string

EXEC OPAL 'MOVE BADGE(badge)'

where badge is a valid badge number. TSO will print several lines,
including

N2770MOV PASSED TO BATCH
badge WILL BE NOTIFIED UPON COMPLETION.

2.2.4   -- Continued.

This indicates that a job has been created and submitted for batch processing to copy the codes file from the user catalog to magnetic tape. The message,

IEF404I N2770MOV ENDED   TIME=hh.mm.ss

indicates that the job is completed.

        The "MOVE" operation results in the deletion of the codes file from the user catalog so that, upon the next "SETUP" operation, no runs will be present in the file. Note: The message

NO CODES TO BE PASSED

indicates that no codes file has been created (return to Step 3, above).

2.3   Running the Interactive Program.

        This subsection describes the use of the interactive program in setting up runs for later batch processing. Program options are defined in 2.3.1, while descriptions of the commands used to assign values to the options are provided in 2.3.2. Several special features of the interactive program are outlined in 2.3.3, and finally, examples of use are given in 2.3.4.

2.3.1   Program Options.

        The interactive program provides the user with control of ten program options, which are grouped into the following categories:

2.3.1   -- Continued.

- allocation control
- input sieves
- satellite model identification
- output sorts.

Each option is assigned a value by the user, or in certain cases, several values. Each option also is uniquely identified by an index number. The purpose of the index numbers is described in Section 2.4.

Descriptions of the options are provided in the following paragraphs. A summary of the options and allowable values appear in Table 1.

2.3.1.1   Options Pertaining to Allocation Control.

The loading algorithm is controlled by two options, type and loading margin.

(01) ALLOCATION TYPE: The user controls the "type" of allocation to be performed. Options are C for "constrained", and U for "unconstrained".

(02) LOADING MARGIN(DB): The user specifies the value in decibels of the link margin the program is to achieve.

2.3.1.2   Options Pertaining to Input Sieves.

Four input sieves are controlled by the interactive program. Two additional input sieves are implicit by the choice of satellite, described later: geometric (line-of-sight) and satellite name (Field P).

Table 1. Summary of Interactive Program Options

Option	Description	Allowable Values	Max No.	Default
(01) ALLOCATION TYPE	Defines allocation algorithm	C,U	1	C
(02) LOADING MARGIN	Defines desired link margin	An integer or real number between -50 and +50	1	3.00
(03) TIMEFRAMES	Defines a sieve on URDB Field E	C,M,L	3	All timeframes
(04) PRIORITIES	Defines a sieve on URDB Field F	J1,J2,J3,J4,J5,J6, J7,S1,S2,S3,S4,S5	12	All priorities
(05) SCENARIO	Defines a sieve on URDB Field HH	ALL, 1,2,3,4	1	ALL
(06) LOCATION PREFERENCE	Defines a sieve on URDB Field NN	ANY, URDB	1	URDB
(07) NAME	Defines satellite model by name	AF,D2,D3,FL	1	D3
(08) MODEL ID	Defines a unique satellite model	An integer from 1 to 99	1	1
(09) LOCATION	Defines satellite location	A,E,I,W	1	A
(10) SORTS	Defines output sorts to be printed	1,2,3,4,5,6,7,8,9, 10,11,12,13,14,15	15	All sorts

2.3.1.2   -- Continued.

(03) TIMEFRAMES: The user specifies a sieve on URDB field E
by entering allowable timeframes. Up to three timeframes
may be entered. Values are C for "current", M for "mid-
range", and L for "long-range".

(04) PRIORITIES: The user specifies a sieve on URDB field F
by entering allowable priorities. Up to twelve priorities
may be entered. Values are J1 through J7, representing
joint priorities, and S1 through S5, representing service
priorities.

(05) SCENARIO: The user specifies a sieve on URDB field HH by
entering the single allowable scenario. Values are 1,2,
3 and 4, each of which identifies a particular operational
scenario.[2] Entering "ALL" bypasses the SCENARIO sieve.

(06) LOCATION PREFERENCE: The user controls a sieve on URDB
field NN by this option. Entering "URDB" specifies that,
for an entry to be loaded, its preferred satellite location
must correspond to the satellite model location in use
(described below). Entering "ANY" bypasses the LOCATION
PREFERENCE sieve.

2.3.1.3   Options Pertaining to Satellite Model Selection.

The satellite model to be used on a particular run is identi-
fied by "name", model identification number and gross location.

───────────────

2. MILSATCOM Systems Office, "Users Guide for Augmentation of the
MILSATCOM User Requirements Data Base," 6 June 1977

11

2.3.1.3   -- Continued.

(07) NAME: The user specifies an abbreviated "name" identify-
     ing the satellite. Values are AF for AFSAT, D2 for
     DSCS-II, D3 for DSCS-III and FL for FLTSAT.

(08) MODEL ID: The user specifies an index that, combined
     with NAME (above), identifies a unique satellite model in
     the Satellite Model Data Base. Any integer value between
     1 and 99 is allowed.

(09) LOCATION: The user specifies which of the four locations
     in the Satellite Model Data Base is to be used. Values
     are A for Atlantic, E for East Pacific, I for Indian
     Ocean and W for West Pacific.

2.3.1.4   Option Pertaining to Output Sorts.

The selection of output sorts is controlled by a single option.

(10) OUTPUT SORTS: The user selects output sorts by entering
     the index of each sort desired. Indexes are:

                    1 - Line item
                    2 - Submitting command
                    3 - User community
                    4 - WWMCCS/Non-WWMCCS
                    5 - Service
                    6 - Receive location
                    7 - Receive terminal type
                    8 - Network
                    9 - Priority
                   10 - Multiple-access type

2.3.1.4   -- Continued.

            11 - Type of operation
            12 - Country of receipt
            13 - Service availability
            14 - Type of service
            15 - Quality of service.

2.3.2   Program Commands.

        Definition of values to the options described in the previous
subsection is accomplished through the issuance of commands. Depending
upon the command issued, the program will prompt the user for value
assignment to one or more of the program options. Additionally, commands
are used to obtain an output of the current status of the options, to
copy the status of options into the codes file (thereby "submitting" a
run), to retrieve and delete previously submitted runs, and to terminate
execution of the program.

        The program indicates that it is ready to accept a command
by printing

            COMMAND READY

When a command is accepted and interpreted, and all operations dictated
by the command are performed, the program returns to the "command ready"
state.

        This subsection defines the various program commands. The
commands and their meanings are summarized in Table 2.

Table 2. Program Commands

Command	Action Taken
BEGIN	Initiates input sequence for control options
DELETE	Deletes a previously submitted run
END	Terminates program execution
MODIFY	Modifies status of selected option(s)
RETRIEVE	Retrieves a previously submitted run
STATUS	Prints status of options
SUBMIT	Creates a run in the codes file

2.3.2.1   BEGIN Command.

The BEGIN command is used to initiate an input process in which each of the options in Table 1 is assigned a value. As one option is assigned, the next option automatically is prompted.

When multiple values are entered, the values are separated by commas. If an error occurs, the program will indicate the erroneous input and re-request the option. An attempt to enter more than the maximum number of values (indicated in Table 1) results in a warning that extraneous values are ignored.

A carriage return following the prompt will result in a default value being assigned to the option, as indicated in Table 1.

When the tenth option has been assigned, the program returns to the "command ready" state.

2.3.2.2   DELETE Command.

The DELETE command is used to delete a run that was previously created by a SUBMIT command (see 2.3.2.7). When DELETE is issued the program will request the number of the run to be deleted. If the run number entered corresponds to a previously submitted run, that run will be deleted from the codes file (and bypassed by the Loading Program) and the program will print

<p align="center">***RUN # n DELETED .</p>

If the run number specified does not correspond to a previously submitted run, the program will signal the error and return to "command ready" state with no further action.

<p align="center">15</p>

2.3.2.3   END Command.

The END command is used to terminate execution of the inter-active program. Control will be returned to TSO.

2.3.2.4   MODIFY Command.

The MODIFY command is used to initiate an input process in which selected options are assigned values. The program first requests the indexes of the options to be modified. Indexes may be entered in any order, separated by commas; an invalid index will result in termin-ation of the "modify" operation.

The program then prompts for each of the options that were selected for modification. As one option is assigned, the next is automatically prompted.

When multiple values are entered, the values are separated by commas. If an error occurs, the program will indicate the erroneous input and re-request the option. An attempt to enter more than the maximum number of values (indicated in Table 1) results in a warning that extraneous values are ignored.

A carriage return following the prompt will result in a default value being assigned to the option, as indicated in Table 1.

When the last specified option has been assigned, the program returns to the "command ready" state.

2.3.2.5   RETRIEVE Command.

The RETRIEVE command is used to retrieve a run that was previously created by the SUBMIT command (see 2.3.2.7). When RETRIEVE

2.3.2.5   -- Continued.

is issued the program will request the number of the run to be retrieved.
If the run number entered corresponds to a previously submitted and
undeleted run, that run will be retrieved from the codes file; i.e.,
the internal status of the control options will be set to their status
in the "retrieved" run; the program will then print

        ***RUN # n RETRIEVED.

        If the run number specified does not correspond to a pre-
viously submitted run, the program will signal the error and return to
"command ready" state with no further action.

                            NOTE

        The STATUS command (described next) may now be used
        to list the status of the retrieved run.

2.3.2.6   STATUS Command.

        The STATUS command is used to obtain the internal status of
all control options.

                            NOTE

        The STATUS command may be used in conjunction with
        the RETRIEVE command (described above) to obtain
        the status of options in previously submitted runs.

2.3.2.7   SUBMIT Command.

The SUBMIT command is used to create a copy of internal option status in the codes file, thereby submitting a run. The date and time, indicated at the initiation of the interactive program, also are stored in the codes file.

When a run is submitted, it is assigned an identifying number:

     ***SUBMITTED AS RUN NUMBER n.

This run number will appear on the output of the batch loading program to identify this particular run. The date and time the run was submitted also will appear as further identification of the run.

A maximum of twenty runs may be submitted in this manner; to submit more than this number is an attempt to exceed the capacity of the codes file and results in an error message.

2.3.3   Special Features.

Several features are available that, under certain circumstances, could be beneficial to the user.

  OBTAINING HELP: Enter a question mark (?) after any request
     for input (including "command ready") to obtain
     instructions for valid input.

2.3.3   -- Continued.

> RETURN TO "COMMAND READY": Enter the character string "ABORT"
> after any request for input to return to the "command
> ready" state.

> IMMEDIATE PROGRAM TERMINATION: Enter end-of-file characters
> (/*) after any request for input to immediately terminate
> execution of the interactive program and return to TSO
> (runs submitted during that execution are lost).

2.3.4   Interactive Program Examples

Example 1: Accessing the interactive program.

        This example illustrates the manner in which the interactive
program is accessed from TSO. A LISTCAT command first is issued to TSO
to verify that the program (OPAL.LOAD) is present in the user's catalog.
The EXEC command is then issued, invoking the program. Note that
messages printed upon program initiation indicate that four runs are
present in the Control Codes File. User inputs are underlined.

```
        LISTCAT
        OPAL.CLIST
        OPAL.LOAD
        READY
        EXEC OPAL 'SETUP'


        ◆◆◆OPAL AT  1:02 ON 15 OCT 77◆◆◆

          ( 4 RUNS SUBMITTED TO DATE)
```

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2.3.4   -- Continued.

Example 2: BEGIN Command.

This example illustrates the use of the BEGIN command in
assigning values to all program options.

```
COMMAND READY
BEGIN

◆◆◆ALLOCATION CONTROL◆◆◆
   (01) ALLOCATION TYPE:
C
   (02) LOADING MARGIN (DB):
1.5

◆◆◆INPUT SIEVE CONTROL◆◆◆
   (03) TIMEFRAMES:
L,M
   (04) PRIORITIES:
J1, J5, S1
   (05) SCENARIO:
3
   (06) LOCATION PREFERENCE:
URDB

◆◆◆SATELLITE  IDENTIFICATION◆◆◆
   (07) NAME:
AF
   (08) MODEL ID:
2
   (09) LOCATION:
E

◆◆◆OUTPUT SORT CONTROL◆◆◆
   (10) SORTS:
1,3, 4
```

2.3.4 -- Continued.

Example 3: STATUS Command.

The use of the STATUS command is illustrated in this example.

```
COMMAND READY
STATUS

    ◆◆◆ALLOCATION CONTROL◆◆◆
        (01) ALLOCATION TYPE: C
        (02) LOADING MARGIN (DB):    1.50

    ◆◆◆INPUT SIEVE CONTROL◆◆◆
        (03) TIMEFRAMES: M L
        (04) PRIORITIES: J1 J5 S1
        (05) SCENARIO: 3
        (06) LOCATION PREFERENCE: URDB

    ◆◆◆SATELLITE MODEL IDENTIFICATION◆◆◆
        (07) NAME: AF
        (08) MODEL ID:  2
        (09) LOCATION: E

    ◆◆◆OUTPUT SORT CONTROL◆◆◆
        (10) SORTS: 1    3    4
```

Example 4: SUBMIT Command.

The use of the SUBMIT command is illustrated in this example.
Note that the run submitted will be identified as Run #5, submitted at
1:02 on 15 Oct. 1977 (the time and date printed upon program initiation),
on the output of the loading program.

```
COMMAND READY
SUBMIT

◆◆◆SUBMITTED AS RUN #  .5
```

2.3.4   -- Continued.

Example 5: MODIFY Command.

In this example, the MODIFY command is used to modify selected options. A SUBMIT command then is issued to enter a run into the Control Codes File.

```
COMMAND READY
MODIFY
        LINE NUMBERS:
1, 7, 8
   (01) ALLOCATION TYPE:
U
   (07) NAME:
D3
   (08) MODEL ID:
1
COMMAND READY
SUBMIT

◆◆◆SUBMITTED AS RUN #   6
```

Example 6: RETRIEVE Command.

In this example the RETRIEVE command is used to retrieve the status of a previously submitted run. A subsequent STATUS command lists the status of the options, indicating the status of the retrieved run.

2.3.4   -- Continued.

```
         COMMAND READY
         RETRIEVE
                  RUN NUMBER:
         2

         ◆◆◆RUN NUMBER  2 RETRIEVED
         COMMAND READY
         STATUS

         ◆◆◆ALLOCATION CONTROL◆◆◆
             (01) ALLOCATION TYPE: C
             (02) LOADING MARGIN (DB):    3.00

         ◆◆◆INPUT SIEVE CONTROL◆◆◆
             (03) TIMEFRAMES: C M L
             (04) PRIORITIES:  J1 J2 J3 J4 J5 J6 J7 S1 S2 S3 S4 S5
             (05) SCENARIO: ALL
             (06) LOCATION PREFERENCE: ANY

         ◆◆◆SATELLITE MODEL IDENTIFICATION◆◆◆
             (07) NAME: D3
             (08) MODEL ID:   1
             (09) LOCATION: A

         ◆◆◆OUTPUT SORT CONTROL◆◆◆
             (10) SORTS: 1    2    3    4    5    6    7    8    9    10   11   12
```

Example 7:   DELETE Command.

        In this example, the DELETE command is used to delete a
previously submitted run from the Control Codes File.


```
         COMMAND READY
         DELETE
                  RUN NUMBER:
         2

         ◆◆◆RUN NUMBER  2 DELETED
```

2.3.4 -- Continued.

Example 8: END Command.

In this example, the END command is issued to terminate the interactive program and return control to TSO. Note that the messages printed upon termination indicate that there are now six runs in the Control Codes File (including those that were deleted). The "READY" line indicates that control has been returned to TSO.

```
COMMAND READY
END


◆◆◆ 6 RUNS SUBMITTED--END OF JOB


READY
```

3. BATCH LOADING PROGRAM.

3.1 Introduction.

This section describes the use of the batch MILSATCOM Loading Program. Controlled by the codes created during interactive run setup (described in the previous section), the batch program accesses the URDB and other supportive datasets to provide summaries of satellite loading.

Submission of the batch program for execution is straight-forward, and as such the emphasis on this section is on the interpretation of its output. A brief discussion of batch job submission is provided in Subsection 3.2.

3.2 Batch Job Submission.

The OPAL MILSATCOM Loading Program is run in batch during classified operations. The lengthy JCL (Job Control Language) necessary for coordinating the supportive datasets (stored on tape) and the control codes (created during interactive setup and passed to a separate tape) is contained in a cataloged procedure dataset. The only JCL required to submit the batch job therefore consists of a JOB statement, an EXEC statement and a null (end-of-job) statement.

The overall job consists of first copying the codes file and all supportive datasets from tape to temporary disk datasets, and finally executing the loading program. Under normal circumstances, system utility output created by the six tape-copy operations is suppressed, while OPAL-generated diagnostic messages are printed. In such circumstances, the following JCL is submitted:

3.2   -- Continued.

        //   JOB
        //   EXEC OPAL
        //

        To suppress diagnostics generated by the program, the EXEC
card becomes:

        //   EXEC OPAL,MSGS='DUMMY,'

        To obtain messages generated by the tape-copy operations, code

        //   EXEC OPAL,GENOUT=

        Finally, to suppress OPAL-generated diagnostics and obtain
tape-copy messages, code:

        //   EXEC OPAL,GENOUT=,MSGS='DUMMY,'

3.3   Batch Job Output.

        Batch job output consists of four parts:

        a.   JCL and system messages;
        b.   ESOGENER utility (tape-copy) messages;
        c.   OPAL-generated loading summaries;
        d.   OPAL-generated diagnostics.

3.3.1   System Messages.

        System messages appear at the front of the job output.
The termination codes of each job step, as well as step and job CPU
times, are indicated therein.

3.3.1 -- Continued.

The batch loading job consists of the following job steps:

Step Name	Function
UNLOAD10	Copies codes file from tape to disk
UNLOAD11	Copies terminal locations data base from tape to disk
UNLOAD12	Copies terminal types data base from tape to disk
UNLOAD13	Copies URDB from tape to disk
UNLOAD14	Copies URDB augmentation from tape to disk
UNLOAD15	Copies satellite data base from tape to disk
RUNLOAD	Executes loading program.

Each of the "UNLOADnn" steps must terminate with a condition code of 0000 in order for the RUNLOAD step to execute. If a nonzero condition code is present, an error has occurred in the copy operation performed by that step; coding

    // EXEC OPAL,GENOUT=

on the subsequent job submission will provide further diagnostic information (see Subsection 3.2).

27

3.3.1 -- Continued.

A termination code of other than 0000 in the RUNLOAD step indicates abnormal program termination. If this occurs, all output should be saved in order that the cause may be determined.

3.3.2 ESOGENER Messages.

ESOGENER (tape-copy) messages normally are suppressed. The user should refer to Subsection 3.2 for instructions on obtaining the ESOGENER messages, and to an appropriate Utility User's Guide for instructions on interpreting the messages.

3.3.3 Loading Program Output.

The output of the Loading Program consists of the various runs defined by the user during interactive run setup. Each run consists of those sorts that were selected for display for that run. In addition, each run contains a "header", comprised of a listing of options in effect for that run, and a summary of satellite transponder resource utilization. Finally, indexes are printed both at the end of each run, indicating the page number of each sort, and at the end of each job, indicating the page number of each run.

Figure 2 illustrates the format of the run "header".* Controlling options are printed in a sequence similar to that used

---

*To illustrate the program output formats, a sample case was run. The simulated URDB and other supportive datasets were based on a 161-access data base developed by Stanford Telecommunications, Incorporated for the Real-Time Adaptive Control System (RTACS) study (R. Alvarez, "Dynamic Traffic Model", Stanford Telecommunications, Incorporated).

```
OPAL                              15 OCT 1977                    RUN NUMBER   1    PAGE   1


RUN NUMBER   1                                             SUBMITTED   1:02      17 AUG 1977
                 ALLOCATION CONTROL
                       ALLOCATION TYPE: U
                       LOADING MARGIN:  3.00 DB

                 INPUT SIEVES
                       TIMEFRAMES: C M L
                       PRIORITIES: J1 J2 J3 J4 J5 J6 J7 S1 S2 S3 S4 S5
                       SCENARIO: ALL
                       SATELLITE DESIGNATOR: 03
                       LOCATION PREFERENCE: ANY

                 SATELLITE IDENTIFICATION
                       NAME: 03
                       MODEL ID:  1
                       LOCATION: A



         ***********************************************************************
 XPNDR   *   POWER   *   POWER   *   POWER   *   EIRP   * BANDWIDTH * DATA RATE *
         *   WATTS   *           *    DBW    *   DBW    *           *    BPS    *
         ***********************************************************************
    1    *    3.33   *   33.29   *    5.22   *   33.17  *   59.75   *  17.93M   *
    2    *   13.59   *   33.98   *   11.33   *   39.28  *   54.74   *  16.42M   *
    3    *   79.01   *  157.54   *   18.98   *   46.93  *  164.19   *  57.46M   *
    4    *    7.42   *   74.21   *    8.70   *   36.65  *   33.00   *   9.90M   *
    5    *   11.93   *  119.28   *   10.77   *   27.52  *   81.90   *  24.54M   *
    6    *   12.36   *  123.61   *   10.92   *   27.67  *   99.04   *  24.08M   *
         ***********************************************************************
```

Figure 2. Format of the Run "Header"

3.3.3   -- Continued.

during interactive run setup. In addition to the run number (at the
top of the page) the time and date of submission are provided for
identification. The transponder resource utilization summary ("XPNDR")
provides totals of power, EIRP, bandwidth and data rate per transponder.

Figure 3 illustrates the format of the line-item ("LINEITEM")
sort. Individual categories represent concatenations of URDB fields
A and B, therefore defining individual entries in the URDB.

29

LINEITEM	POWER			DATA RATE			BANDWIDTH			EIRP		
	WATTS	%	*	BPS	%	*	HZ	%	*	DBW	%	*
USERXXX1 339 *	0.0	0.03 *		192.0K	0.13 *		384.0K	0.11 *		2.1	0.00 *	
USERXXX1 349 *	0.4	0.33 *		1.1M	0.73 *		2.2M	0.61 *		19.5	0.13 *	
USERXXX1 359 *	0.5	0.36 *		1.4M	0.93 *		2.8M	0.78 *		13.4	0.03 *	
USERXXX1 369 *	0.5	0.38 *		1.4M	0.93 *		2.8M	0.78 *		19.4	0.13 *	
USERXXX1 379 *	0.2	0.14 *		1.4M	0.93 *		2.8M	0.78 *		7.3	0.01 *	
USERXXX1 389 *	0.0	0.02 *		195.0K	0.13 *		390.0K	0.11 *		1.5	0.00 *	
USERXXX1 399 *	0.1	0.04 *		160.0K	0.11 *		320.0K	0.09 *		4.0	0.00 *	
USERXXX1 409 *	1.3	1.00 *		2.4M	1.59 *		4.8M	1.33 *		24.5	0.43 *	
USERXXX1 419 *	0.1	0.06 *		50.0K	0.03 *		100.0K	0.03 *		5.4	0.01 *	
USERXXX1 429 *	0.1	0.04 *		196.0K	0.13 *		392.0K	0.11 *		3.8	0.00 *	
USERXXX1 439 *	0.0	0.01 *		27.0K	0.02 *		54.0K	0.02 *		-3.3	0.00 *	
USERXXX1 449 *	0.1	0.10 *		498.0K	0.33 *		996.0K	0.28 *		7.8	0.01 *	
USERXXX1 459 *	0.2	0.14 *		530.0K	0.35 *		1.1M	0.29 *		9.2	0.01 *	
USERXXX1 469 *	0.2	0.17 *		1.3M	0.86 *		2.6M	0.72 *		10.2	0.02 *	
USERXXX1 479 *	0.2	0.12 *		1.0M	0.66 *		2.0M	0.56 *		8.6	0.01 *	
USERXXX1 489 *	0.0	0.01 *		52.0K	0.03 *		104.0K	0.03 *		-3.8	0.00 *	
USERXXX1 499 *	0.0	0.00 *		19.0K	0.01 *		38.0K	0.01 *		-8.2	0.00 *	
USERXXX3 347 *	0.4	0.33 *		1.1M	0.73 *		2.2M	0.61 *		19.5	0.13 *	
USERXXX3 357 *	0.5	0.36 *		1.4M	0.93 *		2.8M	0.78 *		13.4	0.03 *	
USERXXX3 367 *	0.5	0.38 *		1.4M	0.93 *		2.8M	0.78 *		20.3	0.16 *	
USERXXX3 377 *	0.2	0.17 *		1.4M	0.93 *		2.8M	0.78 *		10.0	0.02 *	
USERXXX3 387 *	1.2	0.94 *		404.0K	0.27 *		808.0K	0.22 *		23.7	0.35 *	
USERXXX3 397 *	0.1	0.09 *		768.0K	0.51 *		1.5M	0.43 *		7.4	0.01 *	
USERXXX3 407 *	0.4	0.29 *		226.0K	0.15 *		452.0K	0.13 *		12.5	0.03 *	
USERXXX3 417 *	0.0	0.01 *		50.0K	0.03 *		100.0K	0.03 *		-0.7	0.00 *	
USERXXX3 427 *	0.1	0.04 *		200.0K	0.13 *		400.0K	0.11 *		3.9	0.00 *	
USERXXX3 437 *	0.0	0.01 *		27.0K	0.02 *		54.0K	0.02 *		-3.8	0.00 *	
USERXXX3 447 *	0.2	0.18 *		690.0K	0.46 *		1.4M	0.38 *		10.4	0.02 *	
USERXXX3 457 *	0.2	0.18 *		896.0K	0.59 *		1.8M	0.50 *		10.4	0.02 *	
USERXXX3 467 *	0.1	0.06 *		1.0M	0.66 *		2.0M	0.56 *		11.7	0.02 *	
USERXXX3 477 *	0.4	0.32 *		2.5M	1.65 *		5.0M	1.39 *		12.8	0.03 *	
USERXXX3 487 *	0.1	0.05 *		389.0K	0.26 *		779.0K	0.22 *		5.2	0.00 *	
USERXXX3 497 *	0.0	0.00 *		19.0K	0.01 *		38.0K	0.01 *		-8.2	0.00 *	
USERXXX5 348 *	4.5	3.51 *		1.1M	0.73 *		2.2M	0.61 *		29.3	1.29 *	
USERXXX5 358 *	1.7	1.36 *		1.4M	0.93 *		2.8M	0.78 *		25.8	0.59 *	
USERXXX5 368 *	1.9	1.49 *		1.4M	0.93 *		2.8M	0.78 *		25.7	0.56 *	
USERXXX5 378 *	0.5	0.38 *		1.4M	0.93 *		2.8M	0.78 *		19.4	0.13 *	
USERXXX5 388 *	1.2	0.97 *		404.0K	0.27 *		808.0K	0.22 *		23.4	0.34 *	
USERXXX5 398 *	0.0	0.03 *		160.0K	0.11 *		320.0K	0.09 *		2.9	0.00 *	
USERXXX5 408 *	0.4	0.30 *		2.4M	1.59 *		4.8M	1.33 *		12.6	0.03 *	
USERXXX5 418 *	0.0	0.01 *		50.0K	0.03 *		100.0K	0.03 *		-4.0	0.00 *	
USERXXX5 428 *	0.0	0.03 *		196.0K	0.13 *		392.0K	0.11 *		2.0	0.00 *	
USERXXX5 438 *	0.7	0.51 *		1.5M	0.99 *		3.0M	0.83 *		12.9	0.03 *	
USERXXX5 448 *	0.1	0.06 *		498.0K	0.33 *		996.0K	0.28 *		5.8	0.01 *	
USERXXX5 458 *	0.2	0.14 *		530.0K	0.35 *		1.1M	0.29 *		15.0	0.06 *	
USERXXX5 468 *	0.2	0.16 *		1.3M	0.86 *		2.6M	0.72 *		10.0	0.02 *	
USERXXX5 478 *	0.1	0.06 *		1.0M	0.66 *		2.0M	0.56 *		11.7	0.02 *	
USERXXX5 488 *	0.7	0.57 *		52.0K	0.03 *		104.0K	0.03 *		15.4	0.05 *	
USERXXX5 498 *	0.3	0.22 *		19.0K	0.01 *		38.0K	0.01 *		17.9	0.09 *	

Figure 3.   Format of the Line-Item Sort

30

3.3.3 -- Continued.

Figure 4 illustrates the format of the submitting-command ("ORIGIN") sort. Individual categories correspond to entries in URDB field A.

Figure 5 illustrates the format of the user-community ("USER") sort. Categories A, C, D, F, G, I, N, S, and U correspond to entries in URDB field V, while Z is a program-generated default category.

Figure 6 illustrates the format of the WWMCCS/Non-WWMCCS ("WMCS/NON") sort. The individual categories correspond to entries in URDB field Q.

Figure 7 illustrates the format of the service ("SERVICE") sort. The individual categories correspond to entries in URDB field II.

Figure 8 illustrates the format of the receive-location ("REC. LOC") sort. Those categories not prefixed by an asterisk (*) are fixed-platform locations based on look-ups from the Earth Terminal Locations Data Base, from information in URDB field FF (when a duplex access is generated field DD additionally is used). The *RGN00, *RGN01, *RGN03, *RGN04, *RGN05 and *RGN06 categories are mobile-platform locations corresponding to URDB field H-3 designations of 0, 1, 2, 3, 4, 5 and 6, respectively. The *NB category is a program-generated default location.

Figure 9 illustrates the format of the receive-terminal-type ("TERMTYPE") sort. Two-digital categories (01, 11, etc.) correspond to entries in URDB field EE (when a duplex access is generated field CC additionally is used). Three-digital categories (101, 102, 103, 201, 202, 203) are program-generated default terminal types. Assignment of a line

ORIGIN	POWER		DATA RATE		BANDWIDTH		EIRP	
	WATTS	%	BPS	%	HZ	%	DBW	%
A	14.0	10.98	23.9M	15.82	47.0M	13.29	33.1	3.10
ABCD1	5.3	4.12	19.4M	12.18	36.9M	10.24	27.6	0.89
ABCD2	14.1	11.02	10.9M	7.20	21.8M	6.05	34.4	4.17
ABCD3	8.0	6.27	17.1M	11.31	34.2M	9.51	29.9	1.48
ABCD5	11.4	9.93	14.9M	9.83	29.7M	8.26	30.7	1.79
D	9.8	7.69	13.2M	9.73	26.4M	7.33	32.1	2.48
USERXXX0	14.7	11.48	15.0M	9.94	30.1M	8.35	33.5	3.27
USERXXX1	3.8	2.95	11.9M	7.88	23.8M	6.62	27.2	0.91
USERXXX3	4.4	3.42	12.5M	8.24	24.9M	6.93	27.4	0.83
USERXXX5	12.5	9.80	13.4M	8.87	26.8M	7.45	33.2	3.22

Figure 4. Format of the Submitting-Command Sort

USER	POWER		DATA RATE		BANDWIDTH		EIRP	
	WATTS	%	BPS	%	HZ	%	DBW	%
A	18.9	14.84	29.0M	19.19	58.0M	16.12	33.9	3.73
C	11.6	9.07	18.5M	12.26	37.1M	10.30	33.1	3.12
D	12.9	10.10	27.3M	18.05	54.6M	15.17	31.4	2.08
E	19.7	15.41	30.4M	20.12	60.9M	16.91	34.6	4.40
G	14.0	11.00	14.2M	9.40	28.4M	7.90	33.5	3.43
I	7.7	6.00	15.4M	10.18	30.8M	8.55	31.0	1.94
N	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
S	13.1	10.23	16.3M	10.80	32.7M	9.07	33.5	3.43
U	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
Z	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0

Figure 5. Format of the User-Community Sort

WMCS/NON	POWER		DATA RATE		BANDWIDTH		EIRP	
	WATTS	%	BPS	%	HZ	%	DBW	%
M	32.1	25.17	51.5M	34.08	103.1M	28.63	36.7	7.08
P	35.9	28.11	56.4M	37.29	112.8M	31.33	37.3	9.12
W	29.8	23.38	43.3M	28.63	96.6M	24.06	36.6	5.93
X	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0

Figure 6. Format of the WWMCCS/Non-WWMCCS Sort

```
****************************************************************************
SERVICE    *     POWER       *    DATA RATE    *    BANDWIDTH     *      EIRP       *
           *  WATTS    %      *  BPS       %    *   HZ       %     *  DBW      %     *
****************************************************************************
    1      *  26.3    20.62 *  53.6M   35.41 *  107.1M  29.75 *  35.3    5.22 *
    2      *  28.4    22.23 *  30.6M   20.22 *   61.2M  16.99 *  36.6    6.94 *
    3      *   9.1     7.12 *  30.3M   20.03 *   60.6M  16.83 *  30.9    1.89 *
    4      *  34.1    26.70 *  36.8M   24.33 *   73.6M  20.44 *  37.2    9.09 *
****************************************************************************
```

Figure 7. Format of the Service Sort

3.3.3   -- Continued.

item to a default terminal type is based on URDB fields H-3 (platform type) and P (satellite) as follows:*

Field P	Field H-3	Type	EIRP (dBW)	G/T (dB)
AF, FL	F	101	29	-13
	B, T, V, X	102	26	-20
	A, P, S	103	17	-30
D2, D3	F	201	97	39
	B, T, V, X	202	70	18
	A, P, S	203	72	7

Figure 10 illustrates the format of the network ("NET NAME") sort. The individual categories correspond to entries in URDB field D.

Figure 11 illustrates the format of the priority ("PRIORITY") sort. Categories J1, J2, J3, J4, J5, J6, J7, S1, S2, S3, S4 and S5 correspond to entries in URDB field F. Category X is a program-generated default category.

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*Refer to the OPAL Final Report ESL-TM888 for a complete description of default terminal-type assignments.

REC. LOC	POWER		DATA RATE		BANDWIDTH		EIRP	
	WATTS	%	BPS	%	HZ	%	DBW	%
N	1.9	1.46	1.4M	0.93	2.8M	0.78	19.5	0.13
NOISE	0.7	0.54	52.0K	0.03	104.0K	0.03	15.1	0.05
NOW	1.0	0.75	5.4M	3.58	10.8M	3.01	16.6	0.07
NUMBER	3.7	2.87	1.5M	0.99	3.0M	0.83	29.1	0.99
OCCUR	0.0	0.03	124.0K	0.08	248.0K	0.07	3.1	0.00
OF	0.3	0.27	296.0K	0.20	592.0K	0.16	12.1	0.02
ONE	3.7	2.91	1.4M	0.93	2.8M	0.78	28.2	1.01
OTHER	0.7	0.55	2.1M	1.37	4.1M	1.15	15.2	0.05
PER	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
PHASE	4.2	3.28	1.4M	0.93	2.8M	0.78	29.1	1.24
POISSON	2.2	1.76	1.4M	0.93	2.8M	0.78	20.3	0.16
PROCESS	1.4	1.07	2.6M	1.69	5.1M	1.42	24.9	0.46
RANDOM	0.4	0.28	1.4M	0.92	2.8M	0.77	12.3	0.03
RATE	1.7	1.32	4.4M	2.91	8.8M	2.44	25.5	0.54
RELATION	1.9	1.49	1.4M	0.93	2.8M	0.78	25.7	0.56
RESOL	2.0	1.55	1.6M	1.05	3.2M	0.89	26.4	0.67
RHO	2.3	1.81	14.3M	9.46	28.6M	7.94	20.4	0.17
RICESO	1.9	1.53	20.0K	0.01	40.0K	0.01	19.6	0.14
SECOND	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
SHOWS	3.7	2.91	1.4M	0.93	2.8M	0.78	28.6	1.10
SO	10.7	8.41	33.9M	22.42	67.3M	18.33	25.1	0.49
SUCCESS	1.2	0.94	7.9M	5.25	15.9M	4.41	17.6	0.09
SUITED	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
SYMMETRY	0.7	0.58	30.0K	0.02	60.0K	0.02	21.6	0.22
TAKE	0.8	0.62	9.4M	6.22	18.8M	5.23	21.3	0.21
TAKEN	2.1	1.65	1.2M	0.79	2.4M	0.67	26.4	0.67
THAT	0.0	0.01	27.0K	0.02	54.0K	0.02	-3.3	0.00
THEY	1.2	0.93	4.2M	2.78	8.4M	2.33	24.2	0.40
TWO	13.6	10.66	9.0M	5.93	17.9M	4.98	34.8	4.62
UPWARD	0.0	0.04	183.0K	0.12	366.0K	0.10	3.6	0.00
VARIOUS	5.2	4.06	1.4M	0.93	2.8M	0.78	30.0	1.54
VECTORS	0.7	0.57	52.0K	0.03	104.0K	0.03	15.4	0.05
WE	0.9	0.68	6.3M	4.17	12.6M	3.50	22.7	0.28
WITH	0.4	0.29	226.0K	0.15	452.0K	0.13	12.5	0.03
WORDS	1.8	1.44	5.6M	3.70	11.2M	3.11	19.4	0.13
*RGN00	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
*RGN01	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
*RGN02	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
*RGN03	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
*RGN04	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
*RGN05	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
*RGN06	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
*NB	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0

Figure 8.   Format of the Receive-Location Sort

TERMTYPE	POWER		DATA RATE		BANDWIDTH		EIRP	
	WATTS	%	BPS	%	HZ	%	DBW	%
01	19.4	15.21	88.5M	59.54	177.1M	49.18	29.7	1.44
02	9.4	7.34	12.2M	8.04	24.3M	6.76	30.3	1.62
03	7.7	6.06	24.2M	16.02	48.5M	13.46	29.5	1.36
04	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
05	58.6	45.94	26.3M	17.37	52.5M	14.59	40.6	17.36
06	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
07	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
08	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
09	2.7	2.11	50.0K	0.03	100.0K	0.03	23.7	0.36
10	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
101	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
102	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
103	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
201	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
202	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0
203	0.0	0.0	0.0	0.0	0.0	0.0	-1000.0	0.0

Figure 9.   Format of the Receive-Terminal-Type Sort

NET NAME	POWER		DATA RATE		BANDWIDTH		EIRP	
	WATTS	%	BPS	%	HZ	%	DBW	%
NEET1	8.0	6.27	17.1M	11.31	34.2M	9.51	29.9	1.48
NEET2	5.3	4.12	18.4M	12.18	36.9M	10.24	27.6	0.89
NEET3	14.1	11.02	10.9M	7.20	21.8M	6.05	34.4	4.17
NEET5	14.0	10.98	23.9M	15.82	47.9M	13.29	33.1	3.10
NET	11.4	8.93	14.9M	9.83	29.7M	8.26	30.7	1.78
NETT4	9.8	7.69	13.2M	8.73	26.4M	7.33	32.1	2.48
NETWK1	3.8	2.95	11.9M	7.99	23.9M	6.62	27.2	0.81
NETWK2	4.4	3.42	12.5M	8.24	24.9M	6.93	27.4	0.83
NETWK3	12.5	9.80	13.4M	8.87	26.8M	7.45	33.2	3.22
NETWK4	14.7	11.48	15.0M	9.94	30.1M	8.35	33.5	3.37

Figure 10.   Format of the Network Sort

PRIORITY		POWER			DATA RATE			BANDWIDTH				EIRP		
	*	WATTS	Z	*	BPS	Z	*	HZ	Z	*		DBW	Z	*
J1	*	12.2	9.59	*	19.9M	13.15	*	39.2M	11.05	*		32.8	2.87	*
J2	*	8.1	6.32	*	11.1M	7.32	*	22.1M	6.15	*		31.3	2.06	*
J3	*	1.6	1.23	*	9.6M	6.33	*	19.1M	5.31	*		21.3	0.21	*
J4	*	8.0	6.28	*	10.3M	6.94	*	20.7M	5.74	*		29.2	1.27	*
J5	*	8.8	6.86	*	23.4M	15.47	*	46.8M	13.00	*		28.0	0.96	*
J6	*	12.5	9.76	*	9.4M	6.19	*	18.7M	5.20	*		32.7	2.82	*
J7	*	4.0	3.16	*	11.1M	7.37	*	22.2M	6.19	*		27.6	0.88	*
S1	*	15.6	12.20	*	12.3M	8.16	*	24.7M	6.86	*		34.5	4.30	*
S2	*	5.3	4.18	*	10.3M	6.79	*	20.5M	5.70	*		29.6	1.38	*
S3	*	7.8	6.15	*	10.2M	6.72	*	20.3M	5.65	*		31.3	2.06	*
S4	*	3.5	2.73	*	9.6M	6.34	*	19.2M	5.33	*		27.2	0.80	*
S5	*	10.5	8.21	*	14.1M	9.33	*	28.2M	7.84	*		32.2	2.52	*
Y	*	0.0	0.0	*	0.0	0.0	*	0.0	0.0	*	-1000.0		0.0	*

Figure 11.   Format of the Priority Sort

3.3.3 -- Continued.

Figure 12 illustrates the format of the multiple-access-type ("MULT ACC") sort. Categories SSMA, FDMA and TDMA correspond to entries of S, F, and T, respectively, in URDB field MM.

Figure 13 illustrates the format of the type-of-operation ("TYPE OP") sort. Individual categories correspond to entries in URDB field K.

Figure 14 illustrates the format of the country-of-receipt ("RCOUNTRY") sort. Individual categories correspond to entries in URDB field H-1 (when a duplex access is generated, field G-1 additionally is used).

Figure 15 illustrates the format of the service-availability ("SERV AVL") sort. Individual categories correspond to entries in URDB field L.

Figure 16 illustrates the format of the type-of-service ("TYPE SVC") sort. Individual categories correspond to entries in URDB field I.

```
             *****************************************************************************
MULT ACC     *      POWER      *    DATA RATE    *   BANDWIDTH     *       EIRP        *
             * WATTS      %    *  BPS       %    *  HZ        %    *  DBW        %     *
             *****************************************************************************
     SSMA    *   0.0      0.0  *  0.0      0.0   *  0.0       0.0  *-1000.0      0.0   *
     FDMA    *  97.9     76.66 * 151.2M  100.00  * 302.5M    84.02 *   41.6     22.13  *
     TDMA    *   0.0      0.0  *  0.0      0.0   *  0.0       0.0  *-1000.0      0.0   *
             *****************************************************************************
```

Figure 12.   Format of the Multiple-Access-Type Sort

```
             *****************************************************************************
TYPE OP      *      POWER      *    DATA RATE    *   BANDWIDTH     *       EIRP        *
             * WATTS      %    *  BPS       %    *  HZ        %    *  DBW        %     *
             *****************************************************************************
        B    *  97.9     76.66 * 151.2M  100.00  * 302.5M    84.02 *   41.6     22.13  *
        C    *   0.0      0.0  *  0.0      0.0   *  0.0       0.0  *-1000.0      0.0   *
        D    *   0.0      0.0  *  0.0      0.0   *  0.0       0.0  *-1000.0      0.0   *
        E    *   0.0      0.0  *  0.0      0.0   *  0.0       0.0  *-1000.0      0.0   *
        H    *   0.0      0.0  *  0.0      0.0   *  0.0       0.0  *-1000.0      0.0   *
        M    *   0.0      0.0  *  0.0      0.0   *  0.0       0.0  *-1000.0      0.0   *
        S    *   0.0      0.0  *  0.0      0.0   *  0.0       0.0  *-1000.0      0.0   *
             *****************************************************************************
```

Figure 13.   Format of the Type-of-Operation Sort

```
             *****************************************************************************
RCOUNTRY     *      POWER      *    DATA RATE    *   BANDWIDTH     *       EIRP        *
             * WATTS      %    *  BPS       %    *  HZ        %    *  DBW        %     *
             *****************************************************************************
       AL    *  14.7     11.48 * 15.0M     9.94  *  30.1M     8.35 *   33.5      3.37  *
       AS    *   8.0      6.27 * 17.1M    11.31   *  34.2M     9.51 *   29.0      1.48  *
       CA    *  12.5      9.80 * 13.4M     8.97  *  26.8M     7.45 *   33.2      3.22  *
       CO    *   4.4      3.42 * 12.5M     8.24  *  24.9M     6.93 *   27.4      0.83  *
       MA    *   5.3      4.12 * 18.4M    12.18   *  36.9M    10.24 *   27.6      0.89  *
       ME    *  11.4      8.93 * 14.9M     9.83  *  29.7M     9.26 *   30.7      1.78  *
       MN    *  14.1     11.02 * 10.9M     7.20  *  21.9M     6.05 *   34.4      4.17  *
       NY    *  23.9     18.67 * 37.1M    24.55   *  74.3M    20.63 *   35.6      5.58  *
       WN    *   3.8      2.95 * 11.9M     7.98  *  23.8M     6.62 *   27.2      0.81  *
             *****************************************************************************
```

Figure 14.   Format of the Country-of-Receipt Sort

37

SERV AVL		POWER			DATA RATE			BANDWIDTH			EIRP		
	*	WATTS	%	*	BPS	%	*	HZ	%	*	DBW	%	*
A	*	7.4	5.79	*	18.0M	11.97	*	35.9M	9.97	*	26.5	0.68	*
B	*	8.0	6.24	*	9.6M	5.69	*	17.2M	4.78	*	31.7	2.27	*
C	*	2.7	2.15	*	14.3M	9.47	*	28.6M	7.95	*	21.8	0.23	*
D	*	8.0	6.28	*	13.8M	9.12	*	27.6M	7.67	*	29.9	1.49	*
E	*	2.4	1.88	*	8.9M	5.88	*	17.8M	4.94	*	23.6	0.35	*
F	*	5.7	4.49	*	9.2M	6.05	*	18.3M	5.09	*	30.2	1.60	*
G	*	5.7	4.44	*	9.9M	6.54	*	19.8M	5.49	*	30.6	1.76	*
K	*	11.6	9.05	*	11.1M	7.32	*	22.1M	6.15	*	33.0	3.05	*
M	*	3.6	2.84	*	9.9M	6.57	*	19.9M	5.52	*	27.5	0.85	*
P	*	10.2	7.95	*	13.0M	8.58	*	26.0M	7.21	*	30.9	1.85	*
Q	*	11.6	9.13	*	16.6M	11.00	*	33.3M	9.24	*	32.9	2.91	*
S	*	11.6	9.12	*	5.3M	3.53	*	10.7M	2.96	*	33.1	3.09	*
T	*	1.9	1.52	*	6.2M	4.12	*	12.5M	3.47	*	23.5	0.34	*
V	*	7.4	5.79	*	6.4M	4.26	*	12.9M	3.58	*	30.4	1.67	*

Figure 15.   Format of the Service-Availability Sort

TYPE SVC		POWER			DATA RATE			BANDWIDTH			EIRP		
	*	WATTS	%	*	BPS	%	*	HZ	%	*	DBW	%	*
D	*	11.6	9.13	*	26.3M	17.38	*	52.6M	14.60	*	31.3	2.07	*
E	*	14.3	11.17	*	16.2M	10.70	*	32.4M	8.99	*	33.6	3.51	*
I	*	5.6	4.36	*	14.2M	9.42	*	28.5M	7.91	*	29.7	1.43	*
M	*	14.8	11.56	*	20.0M	13.20	*	39.9M	11.09	*	33.2	3.21	*
R	*	14.7	11.49	*	27.3M	18.03	*	54.5M	15.15	*	33.1	3.15	*
T	*	14.1	11.06	*	14.4M	9.52	*	28.8M	8.00	*	33.5	3.43	*
V	*	3.5	2.76	*	16.1M	10.62	*	32.1M	8.92	*	24.9	0.46	*
Y	*	19.3	15.14	*	16.8M	11.13	*	33.7M	9.35	*	35.0	4.87	*

Figure 16.   Format of the Type-of-Service Sort

3.3.3   -- Continued.

Figure 17 illustrates the format of the quality-of-service
("QUAL SVC") sort.   Individual categories correspond to entries in
URDB field M.

Finally, Figures 18 and 19 illustrate the formats of the
indexes to sorts and runs. As previously mentioned, the sort index
appears at the end of each run, and the index to runs appears at the
end of the job output.

38

QUAL SVC	*	POWER		*	DATA RATE		*	BANDWIDTH		*	EIRP		*
	*	WATTS	%	*	BPS	%	*	HZ	%	*	DBW	%	*
D	*	0.0	0.0	*	0.0	0.0	*	0.0	0.0	*	-1000.0	0.0	*
M	*	0.0	0.0	*	0.0	0.0	*	0.0	0.0	*	-1000.0	0.0	*
T	*	0.0	0.0	*	0.0	0.0	*	0.0	0.0	*	-1000.0	0.0	*
3	*	26.3	20.62	*	53.6M	35.41	*	107.1M	29.75	*	35.3	5.22	*
4	*	28.4	22.23	*	30.6M	20.22	*	61.2M	16.99	*	36.6	6.94	*
5	*	9.1	7.12	*	30.3M	20.03	*	60.6M	16.83	*	30.9	1.89	*
6	*	34.1	26.70	*	36.8M	24.33	*	73.6M	20.44	*	37.2	9.09	*

Figure 17. Format of the Quality-of-Service Sort

```
              RUN   1
         NAME OF SORT          PAGE
           HEADER   .........   1
           LINEITEM..........   1
           ORIGIN   .........   3
           USER   .........   4
           WMCS/NON..........   4
           SERVICE  .........   4
           REC. LOC..........   4
           TERMTYPE..........   5
           NET NAME..........   6
           PRIORITY..........   6
           MULT ACC..........   6
           TYPE OP  .........   6
           RCOUNTRY..........   6
           SERV AVL..........   7
           TYPE SVC..........   7
           QUAL SVC..........   7
```

Figure 18.   Index to Individual Sorts

```
         RUN NUMBER      FIRST PAGE
              1 ..........   1
```

Figure 19.   Index to Individual Runs

ESL-TM887

3.3.4   Program-Generated Diagnostic Messages.

OPAL generates several types of diagnostic messages to warn the user of default actions taken by the program. These messages, grouped according to run number, normally appear as the last set of output in a job listing, but may be suppressed (by proper JCL, as indicated earlier in this Section). A sample diagnostic-message set is provided in Figure 20. The possible messages and their significance are described below.

MESSAGE: DEFAULT ASSIGNMENT MADE TO FIELD ff OF URDB ENTRY aaabbb

MEANING: Field ff of the URDB or Augmentation entry whose "A" and "B" fields contain aaa and bbb, respectively, was in error and a default value was assigned.

MESSAGE: CULLED URDB ENTRY aaabbb FOR ERROR IN FIELD ff

MEANING: Field ff of the URDB of Augmentation entry, whose "A" and "B" fields contain aaa and bbb respectively, was in error and the entry therefore was culled.

MESSAGE: LOCATIONS ENTRY ttt...ttt

MEANING: The entry in the Locations Data Base containing text ttt...ttt was in error and therefore not loaded into the program. Any line items referencing this location therefore were assigned to a default location.

MESSAGE: ATTEMPT TO EXCEED MAXIMUM NUMBER OF LOCATIONS

MEANING: The Locations Data Base contained more than the maximum 92 entries allowed. Additional entries were not loaded into the program; any line items referencing such a location therefore were assigned to a default location.

MESSAGE: TERM TYPES ENTRY ttt...ttt CULLED

MEANING: The entry in the Terminal Types Data Base containing text ttt...ttt was in error and therefore not loaded into the

40

```
                       DIAGNOSTICS RUN NUMBER   1
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX1499 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX5498 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX3497 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX0496 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD3    495 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD5    494 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD1    493 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD2    492 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY A        491 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY D        490 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX1489 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX5488 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX3487 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX0486 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD3    485 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD5    484 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD1    483 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD2    482 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY A        481 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY D        480 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX1479 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX5478 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX3477 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX0476 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD3    475 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD5    474 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD1    473 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD2    472 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY A        471 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY D        470 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX1469 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX5468 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX3467 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX0466 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD3    465 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD5    464 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD1    463 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD2    462 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY A        461 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY D        460 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX1459 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX5458 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX3457 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX0456 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD3    455 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD5    454 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD1    453 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD2    452 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY A        451 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY D        450 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX1449 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX5448 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX3447 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY USERXXX0446 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD3    445 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD5    444 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD1    443 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY ABCD2    442 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY A        441 FIELD 00
DEFAULT ASSIGNMENT MADE TO URDB ENTRY D        440 FIELD 00
```

Figure 20.   Sample Diagnostic Output

3.3.4   -- Continued.

program. Any line items referencing this terminal type
therefore were assigned to a default terminal type.

MESSAGE: ATTEMPT TO EXCEED MAX NUMBER OF TERM TYPES

MEANING: The Terminal Types Data Base contained more than the maximum
44 entries allowed. Additional entries were not loaded into
the program; any line items referencing such a terminal
therefore were assigned to a default terminal type.

MESSAGE: UPLINK POWER IN TRANSPONDER xx BELOW vvv.vvv DBW

MEANING: The total received signal power at the input to transponder
xx was less than the warning threshold, vvv.vvv dBW, assigned
to the transponder in the Satellite Model Data Base.

MESSAGE: ERROR NUMBER n IN SATELLITE DATA BASE--RUN NUMBER r TERMINATED

MEANING: An error was detected in the Satellite Model Data Base for
which there is no default action. Run number r therefore
was terminated, and the program proceeded with the next run
(if any). Refer to Table 3 for a description of the
satellite error code, n.

Table 3. Satellite Data Base Error Codes

Code	Meaning
1	The satellite name designated during run setup was not found in the Satellite Data Base.
2	The satellite identification number designated during run setup was not found in the Satellite Data Base.
3	The satellite location designated during run setup was not found in the Satellite Data Base.
4	The number of antennas specified on the Satellite Identification Record was not between 1 and 15, inclusive.
5	The number of transponders specified on the Satellite Identification Record was not between 1 and 15, inclusive.
6	The number of Antenna Records defined were not found.
7	An Antenna Record contained an unrecognized antenna type.
8	More than one antenna was designated as type MBR.
9	More than two antennas were designated as type MBX19 or type MBX37.
10	One type MBX19 and one type MBX37 antenna were present.
11	The number of transponders specified on the Satellite Identification Record were not found.
12	A Transponder Record contained an invalid multiple-access type.
13	A Transponder Record referenced an undefined antenna on the uplink.
14	A Transponder Record referenced an undefined antenna on the downlink.

Table 3. -- Continued.

Code	Meaning
15	A Transponder Record referenced an MBX19- or MBX37- type antenna on the uplink.
16	A Transponder Record referenced a MBR antenna on the downlink.

44